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THIS BOOK MUST NOT BE

LECTURE
ON
VENTILATION;

DELIVERED BEFORE THE

COBOURG

Mechanics' Institute,

ON

MONDAY EVENING, FEB'Y 22, 1858.

BY

HENRY RUTTAN.

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COBOURG:

PRINTED AT THE "COBOURG SUN" OFFICE.

1858.

LETTER

WILLIAM F. BARNES

BENNY BRYAN

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LECTURE.

Some twenty years ago circumstances of a melancholy nature occurred in this neighborhood, no less than the death by consumption of five young women of one family within the space of two years. These being connexions of my own I was of course much alarmed, and instituting enquiry into the cause, I discovered that notwithstanding it was as well kept a house as in the country, foul air was the cause.

In addition to a damp cellar under the house in which the family lived, the floors both up and down stairs were covered with woolen carpets.

I have been, ever since this period, unremitting in my endeavours to devise means by which we may avoid living as we have done and are now doing, surrounded day and night by this pestiferous fluid—and by which means our children at least may escape its ravages.

In the prosecution of my labours, which I have carried on to the very utmost of my power and abilities, weak and poor as they have been, in the face of every discouragement short of opposition, I have, after the lapse of about thirteen years, placed upon a firm, and, I trust, a lasting foundation, a system of ventilation by which our houses and schools, as well as other habitations, may at the same time, and by the same process, be rendered comfortably warm in winter, and copiously supplied with pure air, to the entire exclusion of the filthy atmosphere, in which we have been obliged to live, and which has been so prolific of disease.

Prior to the period of which I speak, the discussion of this subject of Ventilation was confined chiefly to books and treatises, and, therefore, not generally accessible to the public, but as wealth, luxury, and indolence have brought in their train their natural consequences disease and death, so providentially have ways been opened by means of devoted men, and the press, that information of the actual state of things has become accessible to the masses, and, consequently, a

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In awakening this desire, I have
the satisfaction of believing that I
have contributed my share, and trust
that with the blessing of providence I
may yet be permitted to see the day
when our Architects and Mechanics
will be compelled so to construct our
dwellings, and school houses at least,
as to arrest the further progress of this
awful disease, which is so increasing
in frequency and virulence, that un-
less checked, it will, ere long, become
absolutely epidemic in its charac-
ter.

It would, indeed be a libel upon any
intelligent community to suppose that
being once convinced that a remedy
for this great scourge may be had, its
members would not immediately take
measures to escape it; and my en-
deavour to-night will be to persuade
you that the prevention, at least, of
this disease is possible, and in order
to do this, as it is a professional ques-
tion as well as a practical one, and,
moreover, as a prophet hath no hon-
our in his own country, I shall make
no apology for drawing largely upon
professional men, in order to prove to

you by competent witnesses, the position which I have assumed.

In the first place, it is not only necessary that we should know (which all who have understandingly read their Bible do know) but that we should *deeply feel* that whatever the Almighty has ordered and provided for our sustenance here, is that, and *that only* which can sustain us: and further that we cannot any more in the physical, than in the moral world contravene His laws with impunity. Punishment will as certainly follow this contravention in the one case as in the other. We all know, from every day's observation that this is true as regards our physical existence, and I look upon this as one of the strongest proofs that can be brought home to the understanding of man of the truth and authenticity of the Bible.

Now, notwithstanding that we acknowledge all this, is it true that in the matter in hand—the breathing of impure air within our dwellings and schools, we are not contravening the laws of Him, who has so bountifully supplied us with a pure material for our sustenance—by fencing out by brick and stone walls this ocean of at-

mosphere provided expressly for this purpose—I admit that it is necessary that we should have houses to dwell in, but then, inasmuch as we have been endowed with reasoning faculties, by which, notwithstanding these walls, we may have a full supply of this precious material, and have made no use of these faculties, we are virtually “guilty of the law.” Until we so construct or adapt our dwellings as to make them breathe—that is inhale pure, and exhale foul air, we can never expect health,

It may seem strange to you that notwithstanding all my labours and exertions, there are yet only 5 or 6 Architects in the Province, and, I may add, in the world, who can be entrusted with building for Ventilation, and I am happy to say that one of these is a resident of a neighbouring Town.

Having made these necessary preliminary observations, and feeling that, notwithstanding my desire to avoid becoming tedious to you, I shall be obliged to draw largely upon your patience, I proceed at once to the subject.

Ventilation is of two kinds, Mechanical and spontaneous or natural. Mechanical Ventilation is carried on by mechanical means, such as that in the British House of Commons, and in many Public Institutions, both in Europe and America, where the Ventilating air is propelled by means of large fans worked by machinery whose motive power is the Steam Engine. It is not worth while to trouble you with any more minute description of this kind of Ventilation because the expense attending its operation is so far beyond the means of any ordinary private family that its adoption generally is out of the question, and if it were otherwise, it is, after all, less efficient than that carried on by natural means.

Nor is it my intention at present to describe the method by which spontaneous or natural Ventilation is carried on. This would of itself occupy the time of an ordinary lecture, and it is, moreover, not interesting to a mixed audience, but useful to mechanics and practical men only, before whom, at some future time, I shall have much pleasure in discussing it.

There are three general heads, under which the whole subject of Ventilation may be arranged for consideration.

1st. The necessity of Ventilation.

2nd. The reason why we do not ventilate.

3rd. The *modus operandi*, or manner and means by which Ventilation may be carried out.

That which I have deemed the most useful for this occasion is the first head, viz: The necessity of Ventilation.

How wonderful is the order of Providence that that material, which is the most necessary and precious to the animal and vegetable creation, should be supplied in the greatest abundance! It has been well said that whilst one can live several days, sometimes weeks—without food, no one can live three minutes without air.

Mr. Jackson of Edinburgh says.—“The atmosphere is an invisible, aeriform fluid, which wraps the whole earth round to an elevation of about forty-five miles above the highest mountains. This great ocean of air, as we may call it, is far from being

of a uniform density throughout its mass. At, and near the level of the sea it is most dense in consequence of the pressure above.

As we ascend mountains, or in any other way penetrate upward, the air becomes gradually less dense ; and so thin is it at the height of three miles, as for instance, at the summit of Mont Blanc one of the Alps, that breathing is there performed with some difficulty. Beyond these limited heights the density of the air continues to diminish, and at the elevation of about forty-five miles is believed to terminate.

"So dense are the lower, in proportion to the higher regions, that the one half of the entire body of air is below the height of three miles, the other half being expanded into a volume of upwards of forty miles."

I have thought it necessary to bring before you in the outset the magnitude of this ocean of health and strength, in which we live, and yet, many in the middle of the nineteenth century, are ignorant of the means by which we may avail ourselves of its advantages.

"It is quite clear" says Dr. Reid that society is constructed on errone-

ous principles, as erroneous, indeed, as the architectural arrangements and structure of the houses of its members. *Both are built up without reference to health.* It is also clear that its sacred destiny must yet be fulfilled, although it is now on the wane, and tending to what would seem its final extinction. It must therefore be in its destiny to be regenerated, and this is now evidently practicable. Many causes of degeneracy have been pointed out by late writers. Plans have been suggested for the removal of these causes, and many of them have been removed. This is cheering, but still, men, women, and children, and even the lower animals, are yearly dying by millions for want of fresh air, and many other causes; but the increase of those causes has hitherto more than counterbalanced the success of any attempts that have been made to remove them. Though the thread of human life is nearly as extended as formerly, it has become alarmingly more tiny and delicate; and more easily snapped; and though the human species have rapidly increased in numbers, their phys-

ical and mental energy have almost as rapidly declined.

"*A sanatory regeneration* of society should now be the object of all its members, and one aim of their exertions. Many are, no doubt, ignorant, and the great bulk of society apathetic ; but it is, as has been said, cheering that a revolution of sentiment has commenced. All admonitions, and exertions, however, will be useless, all legal enactments ineffective, unless the people co-operate. This they will not do unless they understand the benefits of those measures, and these they will not understand until they are educated——educated physically, educated morally, educated intellectually, educated religiously, or, in short, educated physiologically. How can they be expected to appreciate pure air, for example, until they have learned and understood its value ? The first step to be secured, the vantage ground to be gained, is to recover by a perfect system of education, and wise sanatory laws, that energy of body and mind, which was possessed, and often perverted by the ancients ; the energy that gave birth to the invincible for-

itude, warlike spirit, and chivalry of the olden time : to attain to this energy *without* the wickedness and vanity, to which, when perverted, it gives rise. Then would we have gained the material out of which to elaborate a structure of society, of body and mind as perfect as is possible in our temporal state. Then would we be in the fair way of achieving the *sanatory regeneration* of the human race. Then our bodies, our minds, our houses, our cities, our communities, our whole social fabric would be, in the course of being, rebuilt on a sure foundation.

“ It has pleased the Author of nature so to constitute man that his body is dependent on the materials with which he is surrounded for nourishment and support, and influenced by a number of agents, which never cease to modify the tone of his constitution throughout the whole period of his existence. They not only affect his animal frame, but, from the manner in which the living spirit is associated with the corporeal tenement in which it dwells, they equally influence his mental faculties. Their just operation is essential to

all the functions of life; but their undue, or unequal action, though not so extreme as to cause death, may lay the foundation of bad health, and give rise to morbid impressions unfavourable to the developement of power, activity, and accuracy of thought and action. Among these, heat, light, and electricity in all their changeful and fluctuating movements are ever modifying his sensations, at times communicating a buoyancy, elasticity, and gaiety of feeling, which he can scarcely repress: while on other occasions he becomes the victim of the fatal influence which they produce upon his system.

But no agent exerts a more continuous power on man than the atmosphere by which he is surrounded. There is nothing, perhaps, that presents a more wonderful combination of properties than is manifested in the endless variety of purposes which it leaves, in respect to his own frame, as well as in reference to the general economy of nature. He depends upon it for the breath of life.— It forms the great *pabulum vitae* to which all other nourishment is subor-

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Not only does the air act continu-
ally whenever it presses on the sur-
face of the body ; it is even brought
into contact with the blood within
the innermost recesses of the lungs,
where its renovating action purifies
the vital fluid before it returns to the
heart from which it circulates in a
living stream to every part of the bo-
dy; producing a never ceasing circle
of chemical changes, so long as there
is life to sustain its movements. And
if we count the number of respira-
tions made in a minute, they will be
found in general to amount to twenty,
so that, upon an average, we draw
upon this great magazine the atmos-
phere for nourishment and support no
less than twelve hundred times every
hour during the whole period of our
existence.

Nor has nature been more profuse
in the supply of that aerial fluid
with which we are surrounded, than
careful in the means adopted for its
efficient application. The interior
surface of the minute cells of the
lungs has been calculated to present
an area about twenty times greater

than the surface of the body ; while the sanguiferous system incessantly returns the vital fluid from every part of the frame to the heart as uniformly as it is propelled, that it may again be renovated by the free draught of air, which is so greedily inhaled by the lungs.

The external surface of the body performs functions of great importance to the maintenance of a sound and strong constitution, though they may be interrupted to a greater extent, for a time, than the function of the lungs, without so immediately affecting life. The operation of insensible perspiration continues without ceasing its invisible agency, unless when urged by extreme heat, or other cause, into inordinate action, or suppressed by some injurious influence that tells speedily upon the constitution. The whole surface of the body is in reality penetrated by a multitude of pores, through which the air exerts a similar agency to that which proceeds with greater energy in the lungs.

The air which we breathe is a compound gas, made up of oxygen, or vital air and nitrogen, a gas which

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will not support life. It is the oxygen which vitalizes the blood, and removes all its impurities by contact with it in the lungs. The use of the nitrogen is mainly to dilute it, as, if oxygen alone were breathed, the vital force would be so much accelerated that the system would speedily give way, and death would soon follow.

The lungs, as has been said, are that principal apparatus by which the air is brought in contact with our blood. In each of our lungs there are one hundred and twenty millions of air-cells, and every time breath is drawn in, the air passes down and fills these little air-cells. On the other hand, the blood is always going and returning to and from these air-cells which compose the lungs ; and in the short space of time that it remains there only a moment—it is entirely changed in its appearance and character. That is, it comes into these air-cells of the lungs impure, and of a purple colour from the veins and after having been submitted to the action of the air, goes out of the lungs red, pure, and bright through the arteries. The arteries immedi-

ately distribute again to all parts of the system the purified blood, which, as it goes through the system, imparts warmth, strength, and life; and by the time it is poured into the veins on its return course, it becomes quite dark and impure again.

The substance which makes the blood dark and impure, and which it is the business of the oxygen to remove, is carbon, known in a more familiar form as charcoal. The process of breathing or respiration is, then, nothing more, in simple language, than exposing this carbon to the oxygen, and burning it, as we burn charcoal, in a furnace; and Professor Liebig has estimated that, in the process of respiration, carbon, equivalent to fourteen ounces of charcoal, is burned within a man daily, which is the source of animal life. Now it must be remembered that when we burn charcoal, the gas thrown off in its combustion is carbonic acid gas, a very deleterious air; and this is precisely the gas, which, produced in a like manner, is thrown off from the lungs.

The atmosphere which we breathe is healthy, then. it is composed

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we breathe is compo-

ed of oxygen, or vital air, diluted with a sufficiency of nitrogen, or unwholesome air, to render it salutary. But as the oxygen, after having been through the lungs, has been taken up and combined with the carbon of the blood; what remains must be nitrogen and carbonic acid gas. And such, actually, is the air thrown off continually from the lungs—a mixture of two unwholesome and poisonous gases.

We may hence learn the vital necessity of having a continuous supply of fresh air for sustaining the healthy action of the human system; but to illustrate this point still further, let us trace the respective operations of air and food in sustaining life.

The time occupied in preparing food for nutrition, by means of the process termed *digestion*, varies with different articles of diet, but probably is never less than two, and in many instances extends to six or eight hours. For this purpose a long and manifold process is necessary, having several distinct steps, and employing a number of separate and complicated organs; and even then the food is not completely changed into blood, but

is yet only *chyle*. Again, fresh supplies of food are required not more than three times, and frequently only twice a day. But how different is it with the atmosphere in these particulars ! Air is no sooner inhaled than its work is begun ; and so rapid is its agency on the blood, that the inhalation of pure air is followed, almost immediately by the exhalation of the same air degenerated, and *twenty times in a minute*, the blood requires an additional supply of oxygen, without which the body suffers.

Secondly—We observe that the digestive apparatus possesses the highly valuable, and very necessary, power of separating the nutritious from the innutritious part of the food.

This is one of its most striking peculiarities. No such power of discrimination, however, is given to the process of respiration. The action of the gases inhaled upon the blood circulating through the lungs is direct, immediate, and positive. If an innocuous gas is taken in with the air, the lungs have no power of separating them ; nor, if it be a poisonous gas, is there any power to deprive it of its injurious properties.

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The action on the blood lungs is di- sensive. If an in with the power of sep- be a poison- ver to deprive lies.

Thirdly, as regards the length of time that a person may exist without any additional food, it is believed to be about three weeks at the longest. Recovery at the end of this time may not be possible ; but still, life may be continued this length of time, at the last, burning more and more feebly in its socket. On the other hand, exclusion of atmospheric air from the lungs for the space of *three minutes*, will generally cause the death of the individual.

But another, and perhaps a still more important, circumstance is here to be noted.

The food which we take into the stomach undergoes several changes, before it is prepared to enter the circulation. These changes effected, it is finally poured directly into the current of blood, as the latter is about entering the right side of the heart prior to its being transmitted through the lungs. It is not yet blood : it has neither the colour, nor the chemical properties of that important fluid. It has yet to be sanguified, *and for this final step the air is necessary*. For this purpose the chyle is brought, in the lungs, in contact with, and is

acted upon by the air in these organs. Without contact with the air and deriving a vital principle from it, it would still be unfitted to nourish the body. If, therefore, we consider digestion to comprehend *every* step which the food undergoes, from mastication to its conversion into blood, we must consider *respiration as the last act of digestion*, and essential to it. Without the former, the latter function would be useless; for our food, unable to undergo the final change necessary to sustain life, and to replace the worn out material of the body, would become a burden; without the atmosphere the food would be useless.

One more fact will complete the contrasts of these two sources of animation. Rare are the circumstances, except among the destitute, in which a sufficiency of food cannot be obtained; the danger with most persons is on the other hand. Repletion and surfeiting are far more frequent, and productive of great danger. But we cannot inhale the air in too great a quantity, or of too pure a quality. The lungs, as well as the stomach, are a digestive apparatus. The one

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digests food, the other air, but here the analogy terminates, and one of their principal distinguishing characteristics is, that while the stomach may possibly admit a quantity of food sufficient to paralyze its powers, and even suspend digestion altogether, such is the construction of the lungs, that by their own self-adjusting power they under no circumstances will admit a greater quantity of air than is required for the due ventilation of the blood, the sanguification of the food, and for the performance of the other numerous and important processes to which respiration is made subservient.

When pure, air can do no harm in the greatest amount than can possibly be inhaled. On the contrary, the greater the amount of food eaten, the greater is the amount of air required to sanguify it; and, whether much or little is eaten, the more thoroughly and rapidly it is aerated, the better.

With a knowledge of these differences between food and air; of the vast personal, social and economical benefits derivable from the inhalation of the latter in uniform purity; of its unfailing abundance, and facility of

attainment ; and the ease with which its impurities may be avoided ; is it not one of the most surprising facts in the history of civilization, that so much discomfort and ill-health, so premature and so great mortality, as are directly attributable to them should be permitted ?

We are now prepared to comprehend with some degree of clearness the vital nature of the relationship which animals sustain to the atmosphere. We proceed, therefore, to direct our attention to the necessity of a sufficient supply of it. We dwell at the bottom of an immense ocean of air, which presses on all sides of us with the weight of tons. It accompanies us into all places, unless by special arrangements we contrive to bar it out. All that the infinitely wise Creator can do He has done to supply us with this first and highest of earthly necessities. The birds of the air, the beasts of the field, and even the savages of the forest, in their open wigwams, enjoy the blessing in all its bounty and fulness. *Civilized man* alone cuts himself off from the beneficent and all invigorating atmosphere by retiring

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into air-tight chambers, and using the same gases over and over again, as if *they* were a taxed commodity, and *he* a miser. The volume of the atmosphere is so vast that its composition is not sensibly disturbed by the breathing of animals : the proportion of oxygen remains unchanged if respiration is performed in the open air, while the carbonic acid expired, instead of accumulating about the individual, is dissolved away by the great law of gaseous diffusion. But when a person enters a house, or an apartment surrounded on all sides by solid walls, impenetrable to the air, the case is totally changed ; the immense expanse of the atmosphere is suddenly reduced to the dimensions of a few hundred cubic feet ; the alterations now produced by breathing are rapidly communicated to the whole mass of air ; and the person occupies towards it an entirely new relation ; one, however, over which he has absolute control.

The first effect of respiration on the air is the withdrawal of its oxygen ; and as the proportion of this life-sustaining element decreases, the bodily powers become less and less active,

simply from want of their proper stimulus. The natural proportion of oxygen in pure air being adapted to the most perfect performance of the animal machinery, a reduction in this amount, however slight, must be attended by a corresponding depression of the vital energies. We have seen enough of what takes place within the bodily organism to understand that the condition of health depends upon the harmonious and balanced play of opposing forces. If the equilibrium of these forces is disturbed, the vital machine goes wrong; it is an unnatural, a diseased state. A slight diminution in the proportion of respired oxygen does not produce any immediate or palpable malady, but it certainly disorders the natural healthful operations of the system to a greater or less extent, and thus lays it open to the assaults of disease. It undoubtedly prepares the soil, and sows the seed, which in due time, springs up into that luxuriant harvest of ailments and complaints, which is reaped by the victims of modern refinement and civilization.

But it is not alone deficiency of oxygen which renders air irrespirable;

their proper proportion of being adapted to the performance of the function in this, must be attending depression. We have seen place within to understand health depends and balanced es. If the es is disturbed does wrong; it sed state. A proportion of t produce any malady, but it natural healthful n to a greater ays it open to It undoubt- and sows the , springs up rvest of ail- which is reap- odern refine- deficiency of • irrespirable;

the presence of an undue quantity of carbonic acid is a still more potent cause of mischief. It has been shewn by experiment that an animal may be kept alive in a limited quantity of air until a very considerable exhaustion of oxygen takes place, provided the carbonic acid be removed as fast as it is formed; but if it is suffered to accumulate, death ensues much more speedily. In confirmation of the general statement made in the preceding paragraph it has been found that the baneful effects of carbonic acid upon the system increase with the deficiency of oxygen. From experiments on inferior animals it has been concluded that three per cent, of carbonic acid, if formed from the oxygen of the air, would prove fatal to man, while, with the natural quantity of oxygen, twice or even thrice the proportion of carbonic acid might not produce death.

The proportion of carbonic acid in expired air is from four to eight per cent: and it is assumed by different experimenters, that this, together with the other exhalations of the

body, contaminates from seven to ten cubic feet of air per minute.

The excretion of carbonic acid from the lungs is less complete in proportion as the external air is already charged with this gas ; and, in like manner, as the amount of oxygen in the inspired air diminishes, it exhibits less and less tendency to diffuse through the cell membranes into the blood. Watery vapour, too, which is excreted both by the lungs and skin, evaporates sluggishly, if the air is loaded with moisture, so that the moment the normal condition of the air is disturbed, there arises a tendency in the air itself to augment the evil. Not only is there an excess of carbonic acid in the air, which is injurious to the system, but it operates to prevent the escape of what is continually produced. Not only is there a deficiency of oxygen in the inhaled air, but what there is enters the body, as it were, with reluctance.

The stupefying effect of dark venous blood poured through the brain is, unhappily, most apparent where there is expected to be the highest degree of mental activity. Churches, public assembly rooms, and schools are but

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rarely provided with due means of ventilation, by which a constant supply of pure air may be maintained; and the inattention, dulness, and sleepiness of both auditors and pupils are but the natural and inevitable consequences of taking into the system a vitiated and poisonous atmosphere. It would be wise for preachers who are annoyed with drowsy congregations, and teachers who are afflicted with pupils of dull and stupid intellect to inquire how far the stimulus of pure air might be advantageously substituted for scolding in the one case, and flogging in the other.

"The tender, sensitive child, that sits, and reads, and learns its lesson, and perhaps cannot learn its lesson, and stupefies, and pines, and droops, and, may be, has scarce a smile to expect when its task is done, yields, day by day, to its atmospheric foes. Day by day, and as it loses the first start of life, its lungs play less freely, its blood circulates more slowly, its chest contracts, its limbs pine away, its digestion is disordered, and before long it is delivered to the tender care of the man, who gallops in every other day, sends whole bales of pills and

draughts, and soon settles, either the life, or the constitution of his unfortunate patient."

It is needless to urge that danger to the health and life of the child is so remote and trifling as to be unworthy of consideration. The reverse is the case. Instances are constantly occurring in which the seeds of disease are gathered in the close and polluted air of the schoolroom, to ripen into premature decay and an early death. Many parents can call to mind the frequent complaints of their children, who have returned from school nervous, feverish, and pale, labouring under a depression of spirits and lassitude of body. A passing emotion of compassion may have attributed their appearance to confinement and study, neither of which is productive of evil effects, unless accompanied by an atmosphere rank with impurity, habits opposed to cleanliness and health, a loss of comfort and necessary recreation.

In a schoolroom with a low ceiling, contracted in size, with no means of ventilation, and containing from fifty to one hundred scholars, the air, inhaled by each different pair of lungs,

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loses its vital properties, and becomes loaded with the impurities and infections thrown off from numerous systems. To contend that there is in this no danger to the health of the child is folly. The temporary symptoms of suffering may disappear with the habits which occasioned them, but the tendencies to disease linger in the system, awaiting some predisposing cause to develop their active strength, and hurry their victim to an untimely grave.

These statements are no exaggeration of the evil, for exaggeration is impossible. Still, the evil is allowed to exist, because its first manifestations are not in a form that appals and terrifies. Its approach is slow and insidious ; the operation proceeds in secret. At length, a frame racked with pain, —a mind debilitated, unbalanced, or diseased,—powers of usefulness or enjoyment destroyed, are the fatal results of a few years spent in a crowded and heated schoolroom. For all these consequences the prevention is of the simplest character. The most ordinary mechanical contrivance will ensure pure air to the child, and the natural result, health and happiness.

to the man. That is a costly economy, which sacrifices sound health, and disregards the danger of disease, to save a trifling expense.

To those inducements to thorough ventilation, which spring from its relation to health, ought to be added an abhorrence of the *very idea* of drinking into our systems, over and over again, the foul and disgusting emanations of putrescence and disease, which often load the air in crowded rooms. To a mind really refined there is little pleasure in the reflection that each breath inhaled has made the tour of a large assembly, forming an acquaintance with every rotten tooth and ulcerated lung that it contains. We instinctively shun the approach of the dirty, the squalid, and the diseased, and use no garment that may have been worn by another. We open sewers for matters that offend the sight or the smell, and contaminate the air ; we carefully remove impurities from what we eat and drink, filter turbid water, and fastidiously avoid drinking from a cup that may have been pressed to the lips of a friend. On the other hand, we resort to places of

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tions offensive, to a certain extent,
from the most healthy individuals :
but when arising from a living mass
of skin and lungs in all stages of
evaporation, disease, and putridity—
prevented by the walls and ceiling
from escaping, they are, when thus
concentrated, in the highest degree
deleterious and loathsome."

It has been estimated that the lungs
of an adult will exhaust about 800
cubic inches of air per minute.—
Well, think how fastidious most per-
sons are about drinking from the same
vessel used by another person—or
partaking of food from the same dish,
or with the same knife and fork.
Nay, it is looked upon with absolute
disgust. Yet all this is cleanliness
itself compared to the air we breathe
in many of the churches, and court-
houses, lecture and concert rooms,
and even dwellings; but especially,
and above all, in railway cars. Con-
sider the number of decayed and dis-
eased lungs, the reservoirs of rum and
tobacco juice, the innumerable labor-

atories of mercury, ipecac, &c., to be found in a crowded promiscuous assembly, and through which channels the air you breathe must have passed once, if not half a dozen times; take into account, also, the vast quantity of insensible perspiration passing from the body of each person present, (including, like enough, legions of the "great unwashed,") and then wonder how you can reconcile yourself to inhaling such life-destroying, soul-sickening impurities; and if, after submitting yourself a voluntary victim to this, you do not consider it the most lackadaisical of qualms to hesitate about eating and drinking from the same dish as your neighbor?

Out of hundreds of instances mentioned in the public prints of deaths by foul air, and familiar to most of the audience, I will only mention two or three of recent occurrence:

"A melancholy instance of the sad effects of breathing air that has been respired over and over again occurred (a few weeks ago) in the New York city prison. Five persons intoxicated were committed on Sunday evening, and locked up in one cell. On Monday morning it was found that

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three of the five had ceased to breathe. Enduring all the tortures of slow gradual suffocation, they died as horrible a death as those who perished in the Black Hole of Calcutta. Yet the architect of the prison, and the officer who made the committals, are not a whit more culpable than thousands of other architects, and tens of thousands of those who listen with a feeling of holy horror at the recital of such barbarous atrocities."

"Almost as soon as a speaker in a crowded assembly begins he usually finds his head full and throbbing—bad air is at work with him. The blood that is going to his brain has not been purified in his lungs by contact with good air. It has a diminished stimulating power. It is the first stage of suffocation. For all that is done with a man that is hung is to prevent the passage of air down his wind-pipe. And if you corrupt the air till it ceases to perform a vital function, it is the same thing in effect; so that a public speaker in a tainted atmosphere is going through a prolonged species of atmospheric hanging.

"The people, too, instantly shew signs of distress. Women begin to fan themselves; children grow sleepy, and well-fed men grow red and somnolent. How people can consent to breathe each other's breath over and over again we could never imagine. They would never return to a hotel, where they were put into a bed between sheets that had been used by travellers before them; no, they must have fresh sheets. They would go without food rather than eat off a plate used by several before them."

We now adduce a few instances of recent occurrence of the destructive effects of foul air. It is true they are of an aggravated character, but they will serve, on that account, the more forcibly to present to the mind the injurious effects of inhaling less vitiated air. Of course, air which is slightly vitiated will not produce such instantaneous or pernicious effects as air which is very much so. Still, the delicate health, and numerous ailments of thousands, may be directly traced to this source. Bad air, in a mitigated form or in small quantity, may be a comparatively slow poison, but is, nevertheless, sure.

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It is strange that down to the present period of the world no warning note has been given as to the Upas tree which we nurture within our own dwellings. I never yet knew of a *healthy* family in a dwelling standing over a wet cellar. Wet or dry, no unventilated dwelling should have a cellar under it. It is always the receptacle of the materials forming the chief food of the family—meat, fish, butter, vegetables, and various other edibles, of course in a state of decomposition, producing night and day, without any intermission, an enormous quantity of malaria. This becomes combined with the carbonic acid gas and ammoniacal substances lying around the building, and by their gravity settling into these cellars. Thus is formed a mass of putridity beyond all comprehension destructive. And whenever this mass of matter is the least disturbed, which is the case every day, it penetrates all edibles, through the floors and up the staircases, and thus, not only are all the edibles served up saturated with poison, but the whole building is filled with a deadly atmosphere.

The Galena *Jeffersonian* gives the

following lamentable picture of mortality in *one house*, Lamar's stage station, fifteen miles east of that city on the Chicago road. It also incidentally touches on the cause of Dr. Ladd's illness and decease. Surely such cases will enforce caution upon those whose cellars are liable to foul air and dampness. It says:

The dead in all are Mrs. Lamar and four children, two servant girls, two stage drivers, the bar-keeper, and a man employed, until yesterday, making coffins for the deceased. After nine had died in the house, which, by the way, is one of the most beautiful and airy situations in the country, the remaining members of the family, and the friends who had come to their aid, removed to the barn across the street, where the two last were seized, and expired. Mr. Lamar, and his only living child, have gone to Shullsburgh, and the place is abandoned.

Dr. Ladd, of Shullsburgh, who died on Thursday morning, was one of the attending physicians. A friend of the family, also living at Shullsburgh, is lying at death's door, if not also dead; and the four stage-drivers, who died in this city within a few days—

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two at the Bradley House, and two at the City Hotel—were in the habit of taking some of their meals, and spending their spare time, at Lamar's house.

This extraordinary mortality is unexampled. We hear that it is accounted for by the condition of the cellar beneath the house. The bottom, it is said, was covered with water in a putrid condition, in which were floating cut pieces of meat, decayed vegetables, and other refuse that will gather in such places.—Over this mass the meat consumed by the family was hanging, and through the accumulations upon it the disease—whatever it may have been—is supposed to have been communicated to the sufferers. Let the warning take hold of all, whose premises contain the seeds of disease.

A similar circumstance occurred at Craydon, in England, in 1854. An epidemic appeared consisting of fever, diarrhoea and dysentery—and all this after the construction of a new system of sewerage intended to improve the sanitary condition of the place. The investigation shewed that an important cause of the epi-

demic was the flooding of the houses with foul air, owing to a defective system of drainage. The drain pipes were made of earthenware, and besides being of too small capacity for the quantity of fluid liable to be poured into them, were frequently beset by the weight of incumbent earth, &c. In this way numerous stoppages occurred, which caused the foul air behind them to be driven out at the entrance of the pipes when water was poured in.

A long account appeared a few weeks since of what at first was supposed to be a case of wholesale poisoning in the National Hotel in Washington.

The President, Mr. Buchanan, was a guest, and in less than three days the building was deserted, about three hundred boarders having been poisoned by eating the meat and vegetables, which, by some means had been exposed to the foul air of a damp cellar, and the effluvia from the drains and cess-pools. The President and many others came near dying, but all were more or less affected.

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have taken place in the gaol for the city of New York, called "The Tombs," these being principally of drunken men, who had been confined in some damp, unventilated cells, called "The five-day cells," and that the coroner's juries had returned verdicts, in each case, of "death from intoxication."

"Last week six individuals, who had been committed to prison on the charge of drunkenness, were crowded into a wet, noisome cell, eleven feet square, having no means of ventilation but a diamond-shaped hole of two inches square, opening into one of the corridors of the prison. On Sunday afternoon these six men, neither of whom had been less than two days in gaol, were put into the cell at six o'clock. On visiting it one hour after, one of them was found dead, and another in convulsions, who was removed to the infirmary. A second visit was made to the cell in the course of the evening, and another of its inmates was removed from it in convulsions. These three cases appear to have afforded no warning to the authorities of the prison, who locked up the hole with its

remaining three victims in it, who were found dead upon opening it in the morning. A coroner's jury was summoned, and returned a verdict of "died from the effects of drunkenness," in each case, although the deceased men had no liquor for several days previous.

The Attorney General, not being contented with these verdicts, ordered the prison to be examined, and Dr. Chilton, the celebrated analytical chemist, was one of the committee of investigation. On entering the cell in which the deaths took place, it was found to be quite wet, and filled with carbonic acid gas, which was streaming into the apartment through a hole in the wall communicating with one of the chimneys. Dr. Chilton filled several bottles with the gas. The Attorney General sent the case before the Grand Jury, who have made a presentation to the court setting aside the verdicts of the Coroner's Juries, and declaring the deaths of the unfortunate sufferers to have taken place from suffocation by inhaling carbonic acid gas. The Grand Jury have also presented the gaol as a nuisance dangerous to the lives of those

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ed, these disclosures have created a
great degree of excitement in New
York.

The next instance is as follows:—
“Death from foul air in a Railway
carriage.”

Mr. G. Brent the deputy Coroner
for West Middlesex, held an inquest
yesterday at the Lord Wellington,
University Street, Tottenham Court
Road, touching the death of an infant
aged ten months, named Thomas
Carr, who died in a Railway carriage
on the London and North Western
line, under the following circumstan-
ces: It appears that the grandmother
of the child was travelling with it un-
der her charge. They were all night
on the road, and she never slept dur-
ing the whole time. Between eight
and nine o'clock on Sunday morning,
the train stopped at Camden Town
to collect the tickets, and, seeing the
child looking very pale and still, she
showed it to a medical man, who
happened to be in the next carriage,
when he pronounced it dying, and it
expired almost immediately after-
wards, but so quietly that she thought
it was dozing off to sleep. In answer

to the coroner the witness stated that the child was lying on her knees the whole of the time ; one of the carriage windows was open ; but it was not inconveniently crowded ; there were also lamps burning all the way ; and she did not feel any inconvenience herself. A medical gentleman, who had made the post-mortem examination of the body, stated that the lungs were gorged with venous blood thereby proving suffocation from foul air. His opinion was that the deceased, being in a delicate state of health, the vitiated atmosphere of the carriage, produced by the breath of so many people, in addition to the combustion by the lamps, would easily cause death, although, probably, a healthier child might have escaped.

As a further proof of the effects, slow, though sure, of this deadly poison, carbonic acid gas, which, being heavier than the common air, is always lying nearest the earth (and of course filling every cellar, or other cavity) I have ascertained upon enquiry, and the facts are susceptible of the most irrefragable evidence, that all our Indian Tribes—without the exception of a single individual—are

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more or less affected by pulmonary, or cutaneous diseases, of which nine out of ten ultimately die. We know as a matter of fact, that these people have, from time immemorial, slept upon, or near the surface of the earth. Now I should like to know to what other cause than the inhaling the carbonic acid gas this mortality from consumption can be attributed. It is notorious, too, for the public papers fully discussed the whole matter about three or four years ago, that within the Eastern Provinces there are a people who are universally affected with a disease which is called Elephantiasis, a species of Leprosy I believe, the details of whose misery are unfit to be named before this audience. These people all live or rather burrow, under ground.

You see, therefore, that whether slowly or rapidly, in one shape or other, foul air taken into the lungs shortens our days, sometimes by a slow process, sometimes by a quick one, according to circumstances, but whether slow or quick, its operation is always sure and certain.

The New York *Tribune*, a paper whose opinions on scientific subjects

are always entitled to great weight, thus comments upon the functions of respiration.

"OUR LUNGS.— If we had an extra life to live, with liberty to devote it to such effort as we deem most conducive to human good, we should begin by studying carefully and thoroughly the chemistry of air, the economy of heating, ventilation, &c., and thenceforward write and print tracts or essays, and give lectures on the general subject of air in its manifold and vital relations to the life and health of man. Since we cannot do this, we shall improve such opportunities as may offer for diffusing just ideas on this important subject.

"The coroner's report of last week's deaths in our city shews that *seventy-one* of these deaths were caused by consumption, thirty-two by inflammation of the lungs, twelve by congestion of the lungs, six by whooping-cough, twenty-one by croup, making *one hundred and forty-two* deaths (out of a total of four hundred and thirty-six) by diseases of the organs of respiration, not to speak of the deaths by Typhus and Typhoid fevers, and some others, which notori-

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ously have their source in pestilent inhalations. These official returns fully justify an estimate based on reliable authority, that fully *one-third* of all the deaths in this country, which amount to nearly one million per annum, are caused by diseases of the throat and lungs. If we reflect that no considerable proportion of the deaths of infants are thus occasioned, we shall realize that almost a moiety of the deaths of adults among us are caused by disorders of the organs of respiration.

"Is this frightful mortality inevitable? To affirm that it is were to impeach the wisdom and beneficence of God. The lungs and their approaches are made to conserve life, and not destroy it; the atmosphere is benignly adapted to their sustenance and use; but we, in our ignorance and heedlessness, vitiate the air, and fill the lungs with disease. Having done this, we fly to drugs to cure evils to which they bear no relation, and pouring drugs into the stomach to cure diseases of the lungs is, ordinarily, just as sensible as the ancient folly of applying cataplasms to a sword in order to heal a wound made by it on

some individual, now, probably, some miles distant. Having run the round of nostrums, from Sarsaparilla to Cod Liver Oil, we discover that the patient gets no better, but is hurrying to the grave; so we try quackery's last shift, and pack him off to Cuba, Italy, or the south of France, (in all which natives are dying of consumption every day) where, jolted by travel, injured by exposure and bad hours, and tortured by the absence of family, friends, and home comforts, he speedily dies, affording our granddames another confirmation of their theory that consumption is essentially and inevitably fatal."

"We have seldom met with any statement in the writings of medical men on our present subject so satisfactory as the following extract from a little work entitled "A practical Treatise on diseases of the Throat and Lungs by Robert Hunter, M. D." The author says—

"The changes which take place in the lungs are produced by the presence in them of a matter, to which the name 'tubercle' has been given, and which matter is secreted from the blood.

"Now if tubercle is the cause of consumption, what is the cause of tubercle? Why is this substance formed in the blood? These are questions that have been frequently asked, but never, I believe, satisfactorily answered. Yet this is the very fountain of the evil. Until correct views are entertained on this subject, whatever success may attend the treatment of consumption in individual cases, we cannot hope to diminish its prevalence.

In my opinion, there is but one great cause of tubercle, and that cause is *a deficient supply of pure air to the lungs*. This deficient supply may be caused by the most dissimilar influences. Persons employed in sedentary occupations, and those compelled to keep the chest bent forward, restraining its movements, (tailors, shoemakers, and clerks,) are *all* particularly obnoxious to consumption.

These, and similar occupations, not only confine the chest, but they also expose the system to other injurious influences, to the want of bodily exercise, and to the noxious effects of impure air. Exercise is necessary to assimilate nutriment, and without it

there can be no vigorous health. *Impure air alone will bring on consumption in the soundest constitution.* The oxygen of the air we breathe regulates our appetite, and, to the weight of a grain, the nutriment that is built up in the system. The chyle undergoes its last vital change in the blood, and that change depends on the perfect performance of respiration, and on a sufficient supply of pure air. When respiration is obstructed by disease, the appetite fails, and the body wastes away. When the air breathed is impure the same thing takes place, the face becomes thin and pale, the features sharp, the respiration hurried, and the appetite poor. Persons so afflicted all die of consumption. No constitution is proof against this influence. The strong man, who has inherited a full development of the chest, may, possibly, bear up under it for a longer time than the feeble scion of a consumptive family; but he, too, will fall in the end from the same disease characterised by the same stages and symptoms, and arising from the same cause. To those hereditarily predisposed I would say. Do not despair, because your parents, or broth-

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ers, or sisters, or other kindred, on ei-
 ther side, have fallen a prey to con-
 sumption. If your frame is delicate,
 and your chest small, seek the open
 air and regular exercise. Observe
 what nature requires, be faithful to
 her demands, and you may live to
 bury half the strong men of your ac-
 quaintance."

"We *know* this is the actual truth,
 whatever may be the merits of the au-
 thor's remedies or mode of treatment
 for the diseases in question. Con-
 sumption, and kindred diseases, are
 not caused by "exposure" to the ca-
 prices and inclemencies of out-door
 weather, one-tenth so often as they are
 by the infecting, debilitating, poison-
 ous malaria of crowded assemblies,
 and unventilated school-rooms and
 bed-rooms. A youth "delicate" in
 constitution, and deficient in stamina,
 is quite commonly supposed to be, *for*
that reason, fitted for a life of in-door,
 sedentary occupation only, when, in
 truth, his frailty of constitution, and
 feebleness of muscle, afford the strong-
 est possible reason for sending him
 forth into the field, and rendering him
 familiar—at first gradually and mod-
 erately—with the axe, the plough, and

all the implements of rugged, invigorating toil. A robust man *may* brave for years the perils of confinement within brick walls, and devotion to sheer brain-work; a feeble person is almost certain to become speedily their victim. But whether you are robust or feeble, in health or sickness, working with head or hands, you cannot afford to work or play, wake or sleep, sit or ride, where there is not a copious supply of pure fresh air."

The following observations by Henry McCormack, M. D., a member of the British Association for the Advancement of Science, will form a suitable conclusion to this part of our subject :

"I desire to present, in a brief, perspicuous form, the result of my investigations as to the connexion of atmospheric impurities with disease. Strictly speaking, there is no natural impurity, except *malaria*, presumably the result of the decomposition of vegetable remains, aided by a certain amount of warmth and moisture.— This it is which gives rise to the whole tribe of periodic disease, from the simple intermittent, or ague of temperate climates, to the destructive re-

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mittents of the Torrid Zone. Of these
last, Yellow Fever is a striking form.
The attempts made in recent, as in
former years, to ascribe it to infection,
have, in my opinion, been unattended
with the slightest success. Putting
aside Typhus Fever, with which we
must take care not to confound it,
Yellow Fever is simply a set of symp-
toms induced by the respiration of air
rendered poisonous by the products of
vegetable decay.

We know, indeed, nothing of the
primary symptoms of small-pox, mea-
sles, scarlet-fever, plague or cholera,
but we do know that their severity is
frightfully aggravated, and their fre-
quency incalculably increased, by
crowding, want of ventilation, insuf-
ficient cleanliness; in short, by eve-
rything that renders air impure and
stationary, a nursery for the leaven,
or ferment, which, being taken into
the lungs, leavens the whole system,
and reproduces the complaint.

The number of cases, in which
Typhus Fever ensues from casual
causes, as cold, wettings, over-effort
rather than infection, is comparative-
ly few. For practical purposes, in-
deed it might almost be assumed that

fever had no other source than infection. Nervous, relapsing, gastric, typhus, typhoid continued, and essential fevers, so termed, are the same. There is not, in fact, the specificity about typhus, which has been asserted. It is simply the result of dirt, crowding, and foul air. There is, however, the important distinction between this malady and febrile exanthema, that no degree of crowding although it may aggravate, gives rise to them, whereas the poisonous atmosphere from human contamination, carried a certain length, is competent to produce fever at any time. If persons, not labouring under fever, by reason of the impurities emanating from their persons, be able so to poison the atmosphere as to entail fever in themselves or others, it follows yet more cogently that persons who do labour under fever, shall thus reproduce the complaint. In point of fact, they do reproduce it, and thus it is that fever comes to abound. When the air, however, is maintained perfectly pure the fever poison either is not created, or, if created, becomes so diluted, as to prove insufficient to the production of further mischief. If fever spread,

then, it may fairly be taken for granted that there has not been a sufficient observance of hygienic precautions. The air has not been renewed; sufficient purity has not been observed. Such is the immensity of the mighty ocean of the atmosphere, that it suffices for the removal of every impurity, if we only resort to the wise, yet simple precaution of instantly replacing the portion that we consume. To breathe a polluted atmosphere, when we have it so completely at our disposal to avail ourselves of that which is unpolluted, is a monstrous error.—It is as if one, who might have fair water from the spring, were to consume soil and impurity instead.

The epidemics of the middle ages, like the febrile and cholera epidemics of recent times, yield, I conceive, forcible evidence as to the truth of these averments. The people in those days, as much too often in these, lived with little regard to the exigencies of their position. There was no adequate provision for personal or household cleanliness—none for the introduction of pure air into the dwellings. *It is not, perhaps, too much to assert that these epidemics are but another name*

for a foul, unrenewed atmosphere.

The production of typhus from the effluvia of human beings plunged in dirt and misery will not, indeed, ensue unless those effluvia be concentrated to the requisite degree of virulence. Still these effluvia, coupled with aerial impurities generally, are not the less productive of other maladies or diseased conditions, directly or indirectly calculated to shorten life. And first and foremost of these conditions are what are called phthisis and scrofula. Phthisis, or Consumption, is merely tuberculous deposit, with conditionally accruing inflammation internally, while scrofula is tuberculous deposit, with the like inflammation externally. As tuberculous deposits are most frequent in the lungs, it is to these that the term consumption is commonly applied. In other respects the bowels, brain, the bones and joints, in short, the frame at large, are all liable to tuberculous disease.

Dyspepsia, or indigestion is so very frequently the attendant of tuberculous degeneration, as by many inquirers to have been looked upon as its necessary precursor. Confinement, a deteriorated atmosphere, want of

sufficient bodily effort, and more especially, the absence of full and free respiration in the open air, together with the consequent impairment of appetite and digestion, are quite enough, however, to account for the concomitance of tubercle and dyspepsia, without referring one to the other in the order of cause and effect.

The habitual respiration of foul, unrenewed air, I look upon as the only real source of tubercle, including under this designation both phthisis and scrofula. *If an individual live constantly, day and night, in the open air or in the air of equal purity with that subsisting in the external atmosphere, he cannot incur consumption.* There are no consumptive Gypsies or Bedouins, so long, at least, as they preserve their aboriginal, out-of-door usages, or are not subjected to confinement or ill-treatment. Consumption from the respiration of mineral dusts, besides its exceptional character, is comparatively rare; and even here an atmosphere otherwise deteriorated is among the destructive agents actively at work. As for hereditary consumption, making due allowance

for the few individuals born tuberculous, and for the greater proneness, under like circumstances, of those sprung from diseased progenitors to disease, there is no such malady.

In-door pursuits are very much more frequently attended by consumption than out-door ones. And were it not for the atmosphere of the pestiferous bed-room, crowded with occupants, and destitute of every provision for the healthy renewal of air, those of the working classes, who follow out-door occupations, would escape very much better than they do.—it may readily be imagined, then, that when in-door pursuits are coupled with foul air in sleeping-rooms, the results must be doubly disastrous.—In fact, they are so.

Short of atmospheric purity, consumption is not less frequent in warm climates than in cold. Intercurrent pneumonia and pleuritis will be less frequent, not so phthisis. Those warm climates, in which consumption is really less frequent than in cold, derive their comparative immunity simply from the people being forced by the great heats to live more in an unpolluted atmosphere. If the inhabitants

of Great Britain and Ireland would but consent, day and night, to live in a pure untainted atmosphere, it would put a total close to the ravages of consumption. It is not sending people to warm climates that averts or cures consumption. It is sending them to pure air, in proportion as they are so sent, that does so, and this only. To confine consumptive persons in close, heated apartments, is but to hasten the ravages of their disease. On the contrary, they should live as much as possible in the open air. Let us keep the consumptive in pure, fresh air, and we shall at once realise a Pau, a Nice, a Madeira, better than any Pau, or Nice, or Madeira, without fresh air. And better still, let us live in a pure, unadulterated atmosphere, or in air equally pure as the open, unadulterated atmosphere, and we shall have no consumption whatever. It is quite illusory to think of curing the consumption by means of food, or even medicine, without the amplest access to the free, fresh air. An ounce of oxygen is worth tons of fish oil, or iodine, or any amount of wire air-sieves for mouth or nostril, without oxygen!

The dirt and sordes, amid which the poor so habitually live, bespeak sufficient condemnation. The senses take alarm, and sympathy and horror are in unison with our best judgments. These monitors, however, are at fault in the dwellings of the rich. There, perfumes regale the nostrils, rich hangings solace the eye. Nevertheless, it is undoubted that atmospheric impurity in the dwellings of the rich, however it may fail to obtrude itself on the senses, is only inferior in virulence and destructiveness to what it proves in the dwellings of the poor. That it is so, let the dreary catalogue of persons of all classes yearly swept away in these islands by consumption declare."

Thus far Dr. McCormack ; extracts of whose opinions upon consumption I have just given you.

To guard you, however, against a misapprehension of him, I must remind you that when he warns us against heated rooms, and urges his consumptively inclined patients to keep out in the open air, he is speaking of the English climate, not of a Canadian winter. It would be preposterous to order any invalid out in-

to the open air at that season in such a climate as this. Here the air must be brought to the individual, not the individual to the air.

Dr. McCormack, who read this paper before the Association of which he is a prominent member, about five years ago, is the first medical man who has ever had the boldness to attribute consumption directly to the effects of foul air, confirming, in the most ample manner, my own observations made, and without any medical knowledge, more than twenty years ago. Not a shadow of doubt need remain on the mind of any man that foul air, *and foul air alone*, is immediately or remotely the cause of consumption.

But it is not malaria alone which causes consumption. Those receptacles of dust and filth, woolen carpets, are the chief cause. Every step we take upon a woolen carpet, in the best kept dwelling house, sends a fog of dust to the very ceiling of the room, and not only dust but myriads upon myriads of particles of wool. So that if our ordinary sight were equal to it, we should regard a carpeted room with perfect horror. A woolen carpet

will last about a dozen years, and within that time our lungs will have taken in about three-fourths of its original weight. What a pity that so beautiful an article of furniture should come to so ignominious an end.

Woolen carpets, brooms and dusting brushes, should be banished from every family. They produce and entail upon every succeeding generation greater mortality than war or pestilence ever did. No family can be a healthy one where they are tolerated.

Oil cloth coverings for our floors, if they must be covered, how much more becoming in every respect.

They may, at first, cost a trifle more, but they last longer, and the saving in doctor's bills will much more than balance that. But when we reflect upon the amount of misery they will prevent for generations unborn, who that values health can hesitate to choose between the two? A mop and a pail of water every morning will do in five minutes what with a woolen carpet will take Betty with broom and dusting brush an hour; to say nothing about wear and tear, and the discomfort of the family.

Having now according to the best

of my ability, and the time at my disposal, discharged my duty, it remains for you, who are parents, to discharge yours. Whether you will hear, or whether you will forbear, I shall feel that I stand acquitted. If the testimony of the wisest and most experienced men, both in Great Britain, and on this continent; if your own experience, and every day's observation, will not convince you that the breathing of an impure atmosphere is the chief cause of the declension in health of our children—of those, especially, who spend six or eight hours every day within the soul-sickening atmosphere of our schoolrooms, laying the foundation of ailments and diseases, by which is entailed upon the next generation a miserable, but happily for them a short, existence—I say, if you are not convinced of this, then is your case a deplorable one indeed, and at least another generation of your families must pass away before an amelioration of your condition can be expected.

Consumption, it is said, is hereditary; this is not true in the full sense of the word. A predisposition to consumption is, beyond all doubt, like

many other ailments arising from a derangements of the blood, transmissible, but is easily prevented. Unless, however, preventatives are employed, the result is much the same as if the actual disease were transmitted. What nature cannot perfect she will never begin, but then you must let her alone, you must not bar her out. You must submit to her laws, not she to yours. Nature's laws carry within themselves their own powers of renovation, and if let alone, that predisposition to disease inherited from our parents will speedily be diminished and effectually warded off. So, on the other hand, if we, like our parents, continue to live in an unhealthy atmosphere, nature being unable to resist our protracted rebellion, our diseases become aggravated till they extinguish whole families, and thus their very name and race are blotted out among men.

Take consolation, then, all who are hereditarily tainted with this disease. Your case is not desperate. Only second, do not thwart nature, whose whole power is being constantly exerted in your behalf, and your children, though liable to diseases, can

both escape from it, and may naturally hope for and attain a long and happy life.

Fathers and mothers—are the health and sickness, life and death, of your dearly beloved offspring : matter of no moment to you ? Would the wealth of India compensate for the perpetual sickness, and premature death, of one child ? Gold cannot measure the worth of a healthy family. Every parent of a healthy and well organised family is infinitely richer than Cræsus in all the essentials of riches—the means of enjoyment.

But I must close—your patience demands it.

If the dreadful malady, which carries sorrow and desolation into thousands of families, spring not from contamination of the blood by the breathing of an impure atmosphere, either remotely or directly, why has it, for so many hundreds of years, defied the skill of the whole medical world ? If it do spring from that cause, let us make an effort at least to rescue our children from its awful ravages. The disease once developed, we know, is incurable ; our only hope, therefore, as I have before stated, lies in PREVEN-

tion. To this end, then, let us turn our most serious attention and earnest endeavors—exertions which we owe alike to ourselves, our country, and our children—by adopting such means as will be most likely to strike at the root of the evil, and lay a foundation, by which, ultimately, under the blessing of the Almighty, we may expect effectually to extirpate this predisposition to a disease the most awfully appalling to which the human family is subject; a disease, which (in the words of an eloquent writer) “so prepares its victims, as it were, for death; which so refines it of its grosser aspect, and throws around familiar looks unearthly indications of the coming change—a dread disease, in which the struggle between the soul and body is so gradual, quiet and solemn, and the result so sure, that day by day, and grain by grain, the mortal part wastes and withers away, so that the spirit grows light and sanguine with its lingering load, and feeling the immortality at hand, deems it but a new term of mortal life—a disease, in which life and death are so strangely blended that death takes the hue and glow of life, and life the gaunt and

grisly form of death—a disease that medicine never cured, wealth warded off, or poverty could boast exemption from—which sometimes moves in giant strides, and sometimes at a tardy, sluggish pace, but, slow or quick, is ever sure and certain.”
